LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A laser array architecture, comprising:

an array of laser fiber amplifiers;

a master oscillator generating a pump signal at a fundamental frequency ~~ω~~;

means for coupling the pump signal into each of the laser fiber amplifiers;

at least one array of nonlinear crystals functioning as harmonic generators;

means for coupling amplified pump signals from the laser fiber amplifiers into respective nonlinear crystals, which generate an array of output sub-beams at a desired harmonic frequency ~~nω;~~

means for detecting phase differences in the output sub-beams comprising:

optical splitting means for obtaining a sample of each of the output sub-beams;

a frequency shifting device connected to vary the frequency of a selected one of the output sub-beam samples; and

a multi-element detector array, each element of which records the result of interfering one of the sub-beam samples with the selected frequency-shifted sample, and generates a phase difference signal;

wherein the selected output sub-beam is used as phase reference and the other sub-beams are adjusted to be phase coherent with the selected sub-beam; and

and a plurality of phase modulators for adjusting the phases of the laser amplifier input signals in response to the detected phase differences, resulting in phase coherency among the output sub-beams.

2. (Canceled)

3. (Currently Amended) A laser array architecture as defined in claim 1, wherein:

the at least one array of nonlinear ~~linear~~ crystals comprises a single array of nonlinear ~~linear~~ crystals functioning as second harmonic generators (SHGs); and

the output sub-beams are at the second harmonic frequency ~~2ω~~.

4. (Currently Amended) A laser array architecture as defined in claim 1, wherein:

the at least one array of nonlinear ~~linear~~ crystals comprises a first array of nonlinear ~~linear~~ crystals functioning as second harmonic generators (SHGs) and an additional array of nonlinear ~~linear~~ crystals cascaded with the first array and also functioning as second harmonic generators (SHGs); and

the two cascaded arrays of SHGs produce an output with a fourth harmonic frequency ~~4ω~~.

5. (Currently Amended) A laser array architecture as defined in claim 1, wherein:

the at least one array of nonlinear ~~linear~~ crystals comprises a first array of nonlinear ~~linear~~ crystals functioning as second harmonic generators (SHGs) and an additional array of nonlinear ~~linear~~ crystals cascaded with the first array and functioning as sum frequency generators (SFGs) to mix the outputs of the first array with the fundamental frequency; and

the two cascaded arrays of SHGs produces an output with a third harmonic frequency ~~3ω~~.

6. (Currently Amended) A laser array architecture as defined in claim 1, wherein:

the at least one array of nonlinear ~~linear~~ crystals comprises a first array of nonlinear ~~linear~~ crystals functioning as second harmonic generators (SHGs) and at least one additional array of nonlinear ~~linear~~ crystals cascaded with the first array; and

the cascaded arrays of nonlinear ~~linear~~ crystals produce an output with a desired ~~n^{th}~~ harmonic frequency ~~nω~~.

7. (Currently Amended) A method for generating, from an array of laser fiber amplifiers, a high power coherent output beam at a desired wavelength in the visible or ultraviolet regions of the spectrum, the method comprising the steps of:

generating in a master oscillator a pump signal at a fundamental frequency ~~ω~~;

coupling the pump signal to each of element of the array of fiber amplifiers;

coupling the amplified pump signal from the array of fiber amplifiers into corresponding elements of an array of nonlinear crystals functioning as harmonic generators;

generating in each element of the array of nonlinear crystals an output signal with a frequency~~, nω,~~ that is a desired harmonic of the fundamental frequency, to provide an array of output sub-beams;

detecting phase differences in the output sub-beams comprising:

splitting off a sample of each of the output sub-beams;

frequency shifting a selected one of the output sub-beam samples; and

interfering each one of the sub-beam samples with the selected frequency-shifted sample in a detector array, to generate a phase difference signal;

wherein the selected output sub-beam is used as phase reference and the other sub-beams are adjusted to be phase coherent with the selected sub-beam; and

adjusting the phases of the laser amplifier input signals in response to the detected phase differences.

8. (Canceled)

9. (Currently Amended) A method as defined in claim 7, wherein the step of generating output signals comprises:

generating output signals at a second harmonic frequency ~~2ω~~ in an array of second harmonic generators (SHGs).

10. (Currently Amended) A method as defined in claim 7, wherein the step of generating output signals comprises:

generating output signals at a second harmonic frequency ~~2ω~~ in a first array of nonlinear crystals, functioning as second harmonic generators (SHGs); and

generating output signals at a third harmonic frequency ~~3ω~~ in a second array of nonlinear crystals cascaded with the first array and functioning as sum frequency generators (SFGs) to mix the second harmonic signals with the fundamental frequency.

11. (Currently Amended) A method as defined in claim 7, wherein the step of generating output signals comprises:

generating output signals at a second harmonic frequency ~~2ω~~ in a first array of nonlinear crystals, functioning as second harmonic generators (SHGs); and

generating output signals at a fourth harmonic frequency ~~4ω~~ in a second array of nonlinear crystals cascaded with the first array and functioning as second harmonic generators (SHGs).

12. (Currently Amended) A method as defined in claim 7, wherein the step of generating output signal employs multiple cascaded arrays of nonlinear crystals performing selected functions to produce an array of output sub-beams at the selected harmonic frequency ~~nw~~.